**SIDIS INITIAL ASSESSMENT PROFILE**

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>7758-94-3</th>
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<tbody>
<tr>
<td>Chemical Name</td>
<td>Iron dichloride</td>
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<tr>
<td>Structural Formula</td>
<td>Cl Fe Cl</td>
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**SUMMARY CONCLUSIONS OF THE SIAR**

**Human Health**

An acute oral toxicity study (Acute Toxic Class Method OECD TG 423) showed that the LD₅₀ of iron dichloride was between 300 and 2000 mg/kg bw. All animals of the 2,000 mg/kg b.w. treatment group and one animal of the 300 mg/kg bw treatment group died. The necropsy showed hemorrhage on lymphatic nodes, stomach, intestine and thymus, and hypertrophy of pancreas and spleen. In the 300 mg/kg bw group, the clinical signs such as hypoactivity and piloerection recovered within the test period. For humans, significant gastrointestinal manifestations occur following ingestion of 20 mg of elemental iron/kg bw while systemic toxicity may occur at 60 mg/kg bw. Generally, doses of various ferrous or ferric salts greater than 150 mg/kg bw of elemental iron are considered serious. According to an acute dermal toxicity study, the acute lethal dose (LD₅₀) was greater than 2,000 mg/kg bw. There was no animal death during the test.

The skin irritancy of iron dichloride was low. Only weak edema was induced on application sites. However, the effect of iron dichloride on the eyes was quite severe. In the early stages after application, opacity of cornea was observed and severe edema with redness and swelling were observed in conjunctiva. These pathological changes were not recovered within the test periods. Therefore, iron dichloride is a corrosive irritant to the eyes. No skin sensitization data are available.

In a repeated dose toxicity study performed according to OECD TG 422, Sprague-Dawley rats were treated orally at 0, 125, 250 and 500 mg/kg bw/day. The rate of body weight gain was decreased in males at 250 and 500 mg/kg bw/day compared to the control group. Black colored liver and hemorrhage with diffuse black pigmentation in the stomach were observed in male rats at 500 mg/kg bw/day. In males at 250 and 500 mg/kg bw/day, the organ weights of liver and adrenal glands were increased. According to these results, the NOAEL value was determined to be 125 mg/kg bw/day for male rats. In female at 500 mg/kg bw/day, three (out of 20) rats died during the treatment period. The liver weights and water consumption were increased and there were histopathological differences. Therefore the NOAEL value for female rats was 250 mg/kg bw/day.

In a genetic toxicity test (OECD TG 471), iron dichloride did not show mutagenic effects on *S. typhimurium* (strains TA 98, TA 100, TA 1535 and TA 1537), and on *E. coli* WP2 uvrA up to 5,000 µg/plate. In an oral in vivo micronucleus assay (OECD TG 474), no increase of the micronucleus was observed when tested up to 50 mg/kg/day (MTD). Therefore, iron dichloride is not considered to be a mutagen.

A reproduction and developmental study on rats was also performed according to OECD TG 422. For the reproduction toxicity, there was no significant difference in mating data, pre and post implantation loss rate between the control group and the treatment groups. For the developmental study, mean litter size, birth rate, survival rate, and body weights of litters were not affected. In conclusion, the NOAEL of iron dichloride on reproduction and developmental toxicity was 500 mg/kg bw/day for both male and female rats.

**Environment**

Iron dichloride is a solid inorganic substance (white rhombohedral crystals), sometimes has a green tint and is very hygroscopic. Its commercial form is liquid. It is freely soluble in water with a solubility of 650 g/L at 25 °C. Vapor pressure, partition coefficient in n-octanol/water and stability in water according to OECD TG 111 are not applicable for the salt of an inorganic substance. Photodegradation and biodegradation are not relevant for an inorganic compound. Environmental fate modeling cannot be performed with the available data.
Bioaccumulation is not expected.

The following studies for aquatic organisms were performed:

Green algae (*Selenastrum capricornutum*): EC\textsubscript{50} (72 h) = 6.9 mg/L (growth rate)
EC\textsubscript{b50} (72 h) = 3.8 mg/L (biomass)

Invertebrates (*Daphnia magna*): EC\textsubscript{50} (48 h) = 19.0 mg/L.

Fish (*Oryzias latipes*): LC\textsubscript{50} (96 h) = 46.6 mg/L.

For fish and algae, the observed effects were partially due to the pH changes. For fish, no mortality was observed up to 100 mg/l of iron dichloride in neutralised solutions. For algae, test solutions dropped below pH 7 at concentrations of 12 mg/l and above.

No data were available on terrestrial organisms. From the results of aquatic organisms of three trophic levels, iron dichloride is considered to be moderately toxic in the aquatic environment.

**Exposure**

In Korea, the estimated production amounts of iron dichloride were approx. 100,000 tonnes/year in 1998. The European production capacity of iron dichloride is estimated to be 250,000 tonnes in 2004.

Iron dichloride is produced by reaction of scrap iron with waste liquid hydrochloric acid in a continuous closed reactor and this chemical is mainly used as a supplementary cohesion agent to treat dye wastewater in textile, dye and paper manufacturing industries and as a raw material for iron trichloride production in Korea. In Europe iron dichloride is used for water treatment, H₂S reduction, as a pigment and for soil immobilization. Further uses are as follows; metallurgy; reducing agent; pharmaceutical preparations; mordant in dyeing; sewage treatment.

Iron dichloride is produced in a closed system and wastewater containing this chemical is recycled in to the manufacturing process. In the wastewater plants of textile, dye and paper manufacturing industries, dye sewage is treated with iron dichloride. Ferrous ion is oxidized to ferric ion which precipitates to form a slurry. The slurry contains ferric hydroxide (Fe(OH)₃) and the supernatant of treated dye sewage is discharged. Therefore, environmental exposure of iron dichloride is expected to be very low and mostly ferric ion would be released.

As for human exposure, there is a potential for exposure to workers via inhalation and dermal routes during the packaging or processing the raw material, cleaning of reaction tank or filtration after the reaction. But occupational exposure is controlled with personal protective equipments like goggles and gas filter mask and with ventilation in Korea. The substance is not classified as a hazardous chemical which is monitored for workplace exposure in Korea annually. Therefore, monitoring data for occupational exposure is not available. ACGIH TLV of iron dichloride is TWA 1 mg (Fe)/m\textsuperscript{3}. In the manufacturing factories, workers may be exposed to the mist of hydrochloric acid but monitoring data by personal air sampling of hydrochloric acid were under TLV-ceiling of 5 ppm.

There is no direct use and there are no consumer products containing iron dichloride in Korea.

**RECOMMENDATION AND RATIONALE FOR THE RECOMMENDATION AND NATURE OF FURTHER WORK RECOMMENDED**

**Human Health:** The chemical is currently of low priority for further work. The chemical possesses properties indicating a hazard for human health (corrosivity). The chemical is produced in a closed system and exposure to workers during the processing of the chemical is low. Based on data presented by Sponsor country (relating to labelling), adequate risk management measures are being applied. Countries may desire to check their own risk management measures to find out whether there is a need for additional measures.

**Environment:** The chemical is a candidate for further work. Based on the aquatic toxicity data and the use pattern presented by the sponsor country, member countries are invited to perform an exposure assessment, and if then necessary a risk assessment. Consideration should be given to the ongoing assessment of other iron salts in the OECD HPV Chemicals Programme.